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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/748,569	12/30/2003	Leonard Ciprian Mosescu	MSFT-2832/304070.01	8073
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EXAMINER				
BROWN, SHEREE N				
ART UNIT		PAPER NUMBER		
2163				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/748,569

**Applicant(s)**

MOSESCU, LEONARD CIPRIAN

**Examiner**

SHEREE N. BROWN

**Art Unit**

2163

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 February 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,5-7,9,10,13-15,17 and 18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,6,7,9,10,13-15,17 and 18 is/are rejected.
- 7) ☐ Claim(s) 5 and 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. This communication is responsive to the amendment filed on 02/20/2009. Claims 1-2, 5-7, 9-10, 13-15 and 17-18 are pending and presented for examination.
2. This action has been made FINAL.

### *Response to Amendment*

3. Referring to the Allowable Subject Matter, examiner appreciates applicant's amendments, however, examiner do not believe the pending claims are in condition for allowance. (See Objections below)

### *Allowable Subject Matter*

4. Claims 5, 7 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

For example, Claim 1 and 9 should recite as:

#### **Claim 1: (Note: Add dependent claim 5 to claim 1)**

A system for compression, the system comprising:

a memory device that stores a b-tree data structure comprising a plurality of compressed and uncompressed normalized index keys, each normalized index key generated by normalizing a plurality of column values that constitute an index key, the normalized index keys stored in sorted order, with no gaps between the stored normalized index keys, and stores a plurality of slots with no gaps between the stored slots, wherein the memory device stores the plurality of compressed and uncompressed normalized index keys starting after a header and the plurality of normalized index keys grows towards an end of the memory device as additional index keys are added;

and, a processor that compresses the stored normalized keys on the memory page by:

(a) determining if a first normalized index key in a memory page of a b-tree data structure should be compressed, wherein the first normalized index key is generated by normalizing a plurality of first column values that constitute a first index key and concatenating the normalized first column values, wherein determining if a first normalized index key should be compressed comprises:

examining an indicator in the slot corresponding to the first normalized index key to determine if the first normalized key is already compressed and not compressing a key that has already been compressed; and

determining if the first normalized index key has a preceding index key on the memory page and not compressing a key that does not have a preceding index key on a memory page;

(b) comparing the first normalized index key with a second normalized index key preceding the first normalized index key in the memory page, wherein the second normalized index key is generated by normalizing a plurality of second column values that constitute a second index key and concatenating the normalized second column values;

(c) generating a common byte length between the first normalized index key and the second normalized index key comprising the number of bytes in the common prefix between the first normalized index key and the second normalized index key;

(d) replacing the first index key in the memory page with the generated common byte length followed by the bytes from the first normalized index key that were not in the common prefix between the first normalized index key and the second normalized index key;

(e) shifting the normalized index keys following the first normalized index key to fill any empty memory space resulting from compressing the first normalized index key

and updating the memory offsets contained in the slots corresponding to the shifted normalized index keys; and

(f) updating the indicator in the slot corresponding to the first normalized index key to reflect that the key is now compressed,

wherein each slot corresponds to a normalized index key in the memory page and comprises a memory offset of the corresponding key and an indicator indicating if the corresponding normalized index key is compressed, wherein the processor compresses the stored normalized index keys before a memory page split.

**Claim 9: (Note: Add dependent claim 13 to claim 9)**

A method for compressing a b-tree data structure, the method comprising the following steps:

storing a plurality of compressed and uncompressed normalized index keys of a b-tree data structure in sorted order in a memory page with no gaps between the stored normalized keys, wherein each index key comprises a plurality of columns each having a column value and a column type and is normalized by normalizing each column value using a normalization function selected based on the column type and concatenating the normalized column values;

storing a plurality of slots with no gaps between the stored slots;

storing a header;

compressing the stored normalized index keys on the memory page,

(a) determining if a first normalized index key in a memory page of a b-tree data structure should be compressed, wherein the first normalized index key is generated by normalizing a plurality of first column values that constitute a first index key and concatenating the normalized first column values, wherein determining if a first normalized index key should be compressed comprises: examining an indicator in the slot corresponding to the first normalized index

key to determine if the first normalized key is already compressed and not compressing a key that has already been compressed; and determining if the first normalized index key has a preceding index key on the memory page and not compressing a key that does not have a preceding index key on a memory page;

(b) comparing the first normalized index key with a second normalized index key preceding the first normalized index key in the memory page, wherein the second normalized index key is generated by normalizing a plurality of second column values that constitute a second index key and concatenating the normalized second column values;

(c) generating a common byte length between the first normalized index key and the second normalized index key comprising the number of bytes in the common prefix between the first normalized index key and the second normalized index key;

(d) replacing the first index key in the memory page with the generated common byte length followed by the bytes from the first normalized index key that were not in the common prefix between the first normalized index key and the second normalized index key;

(e) shifting the normalized index keys following the first normalized index key to fill any empty memory space resulting from compressing the first normalized index key and updating the memory offsets contained in the slots corresponding to the shifted normalized index keys; and

(f) updating the indicator in the slot corresponding to the first normalized index key to reflect that the key is now compressed;

and, after compressing a stored normalized index key, shifting at least one other stored normalized index key to fill an empty memory space resulting from compressing the stored normalized index key, wherein storing the plurality of slots comprises starting

immediately at the end of the memory page and growing towards the beginning of the memory page as additional slots are added, further wherein each slot corresponds to a normalized index key in the memory page and comprises of a memory offset of the corresponding key and an indicator indicating if the corresponding normalized index key is compressed,

wherein compressing the stored normalized index keys is performed before a memory page split.

5. Claims 17-18 are allowed if overcome the pending 35 USC 101 rejection (See Below).

*Claim Rejections - 35 USC § 101*

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 9-10, 13-15 and 17-18 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 9 and 17 lack the necessary components within the meaning of 35 USC 101. In light of *Bilski*, — F.3d —, 88 U.S.P.Q.2d 1385 (2008), an example of a method claim that would not qualify as a statutory process would be a claim that recited purely mental steps. Thus, to qualify as a § 101 statutory process, the claim *should positively recite* the other statutory class (the thing or product) to which it is tied, *for example* by identifying the apparatus that accomplishes the method steps, or positively recite the

subject matter that is being transformed, *for example* by identifying the material that is being changed to a different state. (emphasis added)

The dependent claims are rejected for depending upon a rejected based claim.

*Claim Rejections - 35 USC § 103*

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-2 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ambroziak (US Patent No. 6,055,526, Date of Patent: April 25, 2000) in view of Bumbulis (US Patent No. 2003/0204513, Date Filed: January 27, 2003).

Claim 1:

Regarding claim 1, Ambroziak teaches a system for compression comprising: a memory device that stores a plurality of compressed and uncompressed normalized index keys, each normalized indexed key generated by normalizing a plurality of column values that constitute an index key, the normalized index key stored in sorted order (column 16, lines 37-39, wherein sorting is performed on the C/P groups arrange the concepts in order of there concept identifiers, Ambroziak), with no gaps between the stored normalized indexed keys (column 9, lines 49-50, wherein most fries related to the invention are stored in compressed form, Ambroziak), and stores a plurality of slots



with no gaps between the stored slots (column 1, lines 52-58, wherein compressing an index to obtain a compressed index that is easily stored and transmitted, also providing for decompression of such a compressed index, wherein it further provides maintenance and use of a plurality of files that contain indexing information Ambroziak); and Ambroziak teaches a processor that compresses the stored normalized keys (Figure 2, diagram 210, wherein processor hardware is illustrated, Ambroziak), wherein the processor compresses the stored normalized index keys before a memory page split (Figure 16A, all features, wherein its further defined in column 20, lines 30-41, wherein in Figure 15, diagram 1505, entries in the file are compressed, Ambroziak). Ambroziak is silent with respect to a b-tree data structure wherein a processor that compresses the stored normalized keys, wherein each slot corresponds to a normalized index key in the memory page and comprises a memory offset of the corresponding key and an indicator if the corresponding normalized index key is compressed.

On the other hand, Bumbulis teaches a b-tree data structure wherein a processor that compresses the stored normalized keys, wherein each slot corresponds to a normalized index key in the memory page (paragraph [0068-0069], wherein a query tree is normalized by the normalizer; paragraph [0085], wherein it is also assumed that all keys can be normalized to binary strings in an order preserving fashion; paragraph [0240], wherein for existing B-Tree index implementations, this overhead is usually between 12 and 41 bytes for internal nodes and between 8 and 37 bytes for leaf nodes, depending on the length of the normalized keys and the length of the normalized prefix stored in

each page, wherein this is equivalent to "wherein each slot corresponds to a normalized index key in the memory page", Bumbulis) and comprises a memory offset of the corresponding key (Figure 7B, all features, wherein it illustrates the bit offsets and keys associated with the internal nodes and leaf nodes of the Patricia tree, Bumbulis and an indicator if the corresponding normalized index key is compressed (paragraph [0140], wherein this reads over "a blind search of a Patricia tree or path-compressed binary tree structure typically starts at the root node with an examination of the bit at the specified offset to determine if it is zero ('0') or one ('1 ') and based upon whether the bit being examined is a "0" or "1 ", the search proceeds to the left or to the right, and this process continues until a leaf node is reached, wherein this is interpreted to be equivalent to wherein "an indicator if the corresponding normalized index key is compressed", Bumbulis).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Bumbulis teachings into Ambroziak system. A skilled artisan would have been motivated to combine as suggested by Bumbulis [see abstract] to facilitate quick access by minimizing the size of a b-tree utilizing path compressed binary tile.

#### Claims 2:

Regarding claim 2, Ambroziak teaches wherein the memory device stores the plurality of compressed and uncompressed normalized index keys starting after the header and the plurality of normalized index keys grows towards the end of the memory device as

additional index keys are added (Figure 4, wherein block 3 is illustrated as the header and column 14, lines 45-55, wherein format of document file data structure, wherein the data structure begins with a byte of information used to store compression factor or key for compression, wherein they byte information is followed by a plurality of bytes information, i.e. n bytes, wherein the compressed indexes are decompressed using the compression factor or key that precedes then in the document file, and the number of bytes used to store the compressed indexes, i.e. n bytes may vary depending on the compression factor or key used.; column 6, lines 1-5, wherein each subclass in the hierarchy may add to or modify the behavior specified in the parent class, Ambroziak).

Claim 6:

Regarding claim 6, Ambroziak teaches wherein the processor repeating steps (a)-(f) for each normalized index key in the memory device (column 9, lines 15-18, Ambroziak).

Prior Art of Record

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

\*Ambroziak US Patent No. 6,055,526

\*Bumbulis US PG Publication No. 2003/0204513

***Response to Arguments***

11. Applicant did not point out any disagreements with the examiner's contentions in the previous office action.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

12. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

***Contact Information***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheree N. Brown whose telephone number is (571) 272-4229. The examiner can normally be reached on Monday-Friday 7:00 AM - 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on (571) 272-1834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

14. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sheree Brown  
/Sheree N. Brown/  
Patent Examiner, Art Unit 2163  
Technology Center 2100  
April 9, 2009

/don wong/

Supervisory Patent Examiner, Art Unit 2163